

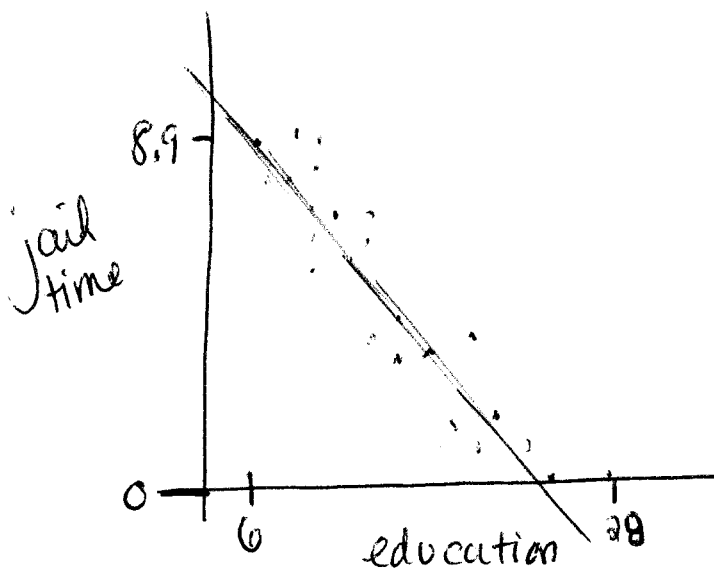
Below is data on the years of education versus the years spent in jail by a sample of 20 – 40 year old men. For this question, round all numbers to 3 decimal places.

Education (Yrs)	Jail Time (Yrs)	Education (Yrs)	Jail Time (Yrs)
24	0	10	5.2
20	2.1	28	0.1
12	5.2	5	8.7
13	3.6	8	8.9
20	0.5	9	7.6
21	1	12	2.3
10	2.2	14	4.5
6	6.5	15	2.1
8	7	17	1.3
10	4	21	0.4
16	2.5	23	0.9
18	1.6	7	9.1

- a. Determine the explanatory and response variables

expi: education resp: jail time

- b. Sketch a scatterplot of the data. Describe the scatterplot.



- negative
- linear
- mod. strong

- c. Find the equation of the LSR line and the correlation coefficient. Sketch the LSR line on your scatterplot from (b).

$$\hat{y} = 9.599 - 0.412x \quad r = -0.875$$

- d. Use the model to predict the number of years in jail for someone with 18 years of education.

$$\hat{y} = 9.599 - 0.412(18)$$

$$\hat{y} = 2.177 \text{ years}$$

(8) 18

- e. Calculate the residual for the prediction in part (d)

$$1.6 - 2.177 = -0.577 \text{ years}$$

- f. Is ~~this~~ the prediction an overestimate or an underestimate? Why?

the prediction was above the true (actual) value.

- g. Interpret the slope of the LSR line in a complete sentence.

$$\frac{\Delta y}{\Delta x} = \frac{-0.412 \text{ years jail}}{1 \text{ year ed.}}$$

For every 1 year of education, the amount of time spent in jail decreases by 0.412 years.

- h. Given that a person has spent 5 years in jail, how many years of education would you predict they have had? (SHOW WORK)

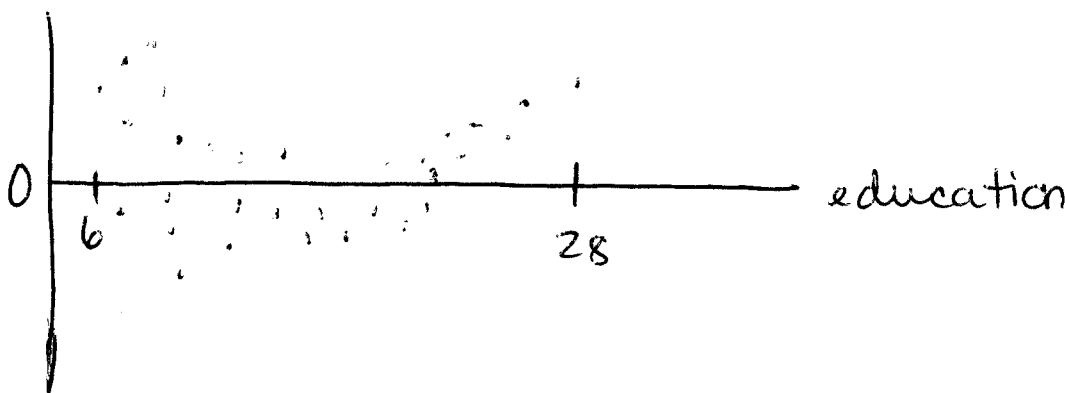
$$5 = 9.599 - 0.412x$$

$$-4.599 = -0.412x$$

$$11.163 = x$$

$$11.163 \text{ years}$$

- i. Sketch the residual plot.



- j. What does the residual plot in part (i) tell us about our linear model? Justify.

-there is a pattern in the plot, so the linear model is not the best model for the data.

k. Find the coefficient of determination and interpret it.

$$r^2 = 0.766$$

76.6% of the change in jail time is due to the change in years of education.

l. What percent of jail time is due to factors OTHER than years of education?

$$1 - 0.766 = 0.234$$

23.4%

m. List some of these other factors that affect jail time (other than years of education). In other words, list some confounding/lurking variables in this situation.

- home life
- neighborhood
- <sup>the</sup> crime committed